

IN THE CLAIMS:

Claims 1-44 and 80-89 were previously cancelled. Claims 50, 52, 53, 61, 68, 70, 71 and 79 have been amended herein. All of the pending claims are presented below. This listing of claims will replace all prior versions and listings of claims in the application. Please enter these claims as amended.

Listing of Claims:

1.-44. (Cancelled)

45. (Previously presented) A method of filling contact holes formed in an insulating layer overlying a substrate of a semiconductor device, comprising:
depositing an aluminum material on an outer surface of the insulating layer and over the contact holes;
wherein the aluminum material exhibits a first stress migration property and a first electromagnetic migration property;
applying pressure to the aluminum material to substantially fill the contact holes therewith;
depositing a different metal material on the aluminum material; and
diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer having a second stress migration property and a second electromagnetic migration property.

46. (Previously presented) The method of filling contact holes of claim 45, wherein depositing an aluminum material comprises physical vapor deposition of the aluminum material.

47. (Previously presented) The method of filling contact holes of claim 45, wherein diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer comprises heating the aluminum material by irradiating the aluminum material with argon plasma.

48. (Previously presented) The method of filling contact holes of claim 45, wherein diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer comprises simultaneously heating the aluminum material with a heater and irradiating the aluminum material with argon plasma.

49. (Previously presented) The method of filling contact holes of claim 45, wherein applying pressure comprises introducing the semiconductor device into a high pressure chamber and pressurizing the high pressure chamber.

50. (Currently amended) The method of filling contact holes of claim 49, further comprising maintaining ~~the~~ a temperature within the high pressure chamber at about 400° C.

51. (Previously presented) The method of filling contact holes of claim 49, wherein the high pressure chamber is pressurized to more than 500 atm.

52. (Currently amended) The method of filling contact holes of claim 45, wherein depositing ~~a~~ the different metal material comprises physical vapor deposition of the different metal material.

53. (Currently amended) The method of filling contact holes of claim 45, wherein depositing ~~a~~ the different metal material comprises vacuum evaporation deposition of the different metal material.

54. (Previously presented) The method of filling contact holes of claim 45, further comprising selecting the different metal material to comprise a metal alloy.

55. (Previously presented) The method of filling contact holes of claim 45, further comprising selecting the different metal material to comprise a substantially pure metal.

56. (Previously presented) The method of filling contact holes of claim 55, further comprising selecting the substantially pure metal to comprise copper.

57. (Previously presented) The method of filling contact holes of claim 56, wherein the copper is deposited on the aluminum material through an electroless plating process.

58. (Previously presented) The method of filling contact holes of claim 55, further comprising selecting the substantially pure metal to comprise nickel.

59. (Previously presented) The method of filling contact holes of claim 58, wherein the nickel is deposited on the aluminum material through an electroless plating process.

60. (Previously presented) The method of filling contact holes of claim 45, wherein diffusing the different metal material comprises annealing the different metal material and the aluminum material to form the substantially homogenous aluminum alloy material.

61. (Currently amended) The method of filling contact holes of claim 45, wherein diffusing the different metal material comprises heating the different metal material sufficiently to diffuse the different metal material into the aluminum material.

62. (Previously presented) A method of filling contact holes formed in an insulating layer overlying a substrate of a semiconductor device, comprising:
depositing an aluminum material on an outer surface of the insulating layer and over the contact holes;
wherein the aluminum material exhibits a first melting point;
applying pressure to the aluminum material to substantially fill the contact holes therewith;
depositing a different metal material on the aluminum material; and
diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer having a second melting point.

63. (Previously presented) The method of filling contact holes of claim 62, further comprising selecting the second melting point of the substantially homogeneous alloyed material layer to be greater than the first melting point of the aluminum material.

64. (Previously presented) The method of filling contact holes of claim 62, wherein depositing an aluminum material comprises physical vapor deposition of the aluminum material.

65. (Previously presented) The method of filling contact holes of claim 62, wherein diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer comprises heating the aluminum material by irradiating the aluminum material with argon plasma.

66. (Previously presented) The method of filling contact holes of claim 62, wherein diffusing the different metal material into the aluminum material to form a substantially homogeneous alloyed material layer comprises simultaneously heating the aluminum material with a heater and irradiating the aluminum material with argon plasma.

67. (Previously presented) The method of filling contact holes of claim 62, wherein applying pressure comprises introducing the semiconductor device into a high pressure chamber and pressurizing the high pressure chamber.

68. (Currently amended) The method of filling contact holes of claim 67, further comprising maintaining ~~the~~ a temperature within the high pressure chamber at about 400° C.

69. (Previously presented) The method of filling contact holes of claim 67, wherein the high pressure chamber is pressurized to more than 500 atm.

70. (Currently amended) The method of filling contact holes of claim 62, wherein depositing ~~a~~ the different metal material comprises physical vapor deposition of the metal material.

71. (Currently amended) The method of filling contact holes of claim 62, wherein depositing ~~a~~ the different metal material comprises vacuum evaporation deposition of the different metal material.

72. (Previously presented) The method of filling contact holes of claim 62, further comprising selecting the different metal material to comprise a metal alloy.

73. (Previously presented) The method of filling contact holes of claim 62, further comprising selecting the different metal material to comprise a substantially pure metal.

74. (Previously presented) The method of filling contact holes of claim 73, further comprising selecting the substantially pure metal to comprise copper.

75. (Previously presented) The method of filling contact holes of claim 74, wherein the copper is deposited on the aluminum material through an electroless plating process.

76. (Previously presented) The method of filling contact holes of claim 73, further comprising selecting the substantially pure metal to comprise nickel.

77. (Previously presented) The method of filling contact holes of claim 76, wherein the nickel is deposited on the aluminum material through an electroless plating process.

78. (Previously presented) The method of filling contact holes of claim 62, wherein diffusing the different metal material comprises annealing the different metal material and the aluminum material to form the substantially homogenous aluminum alloy material.

79. (Currently amended) The method of filling contact holes of claim 62, wherein diffusing the different metal material comprises heating the different metal material sufficiently to diffuse the different metal material into the aluminum material.

80.-89. (Cancelled)